

# PATENT ABSTRACTS OF JAPAN

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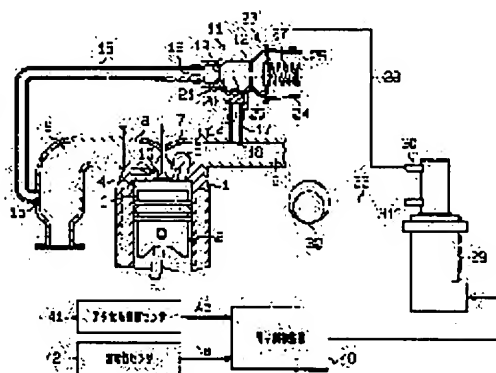
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## (54) EXHAUST GAS REFLUX CONTROL DEVICE OF INTERNAL COMBUSTION ENGINE

### (57)Abstract:

PURPOSE: To restrain excessive generation of accelerating smoke such as recirculation of the accelerating smoke in an exhaust gas reflux control device of a diesel engine.

CONSTITUTION: An exhaust gas reflux control device is composed of conduits 15 and 17 to recirculate a part of exhaust gas of an engine 1 to an intake air system of the engine 1 and an exhaust gas reflux control valve 11 to regulate a recirculating quantity of the exhaust gas through the conduits. An electronic control device 40 calculates a basic command value on a regulating quantity of the control valve 11 on the basis of a load and rotating speed of the engine 1. A gain  $K1$  and a time constant  $Tc1$  to compensate a response delay of a control system and a gain  $K2$  and a time constant  $Tc2$  to compensate wasteful time until the control valve starts operation after a driving command is given to the control valve 11, are calculated on the basis of a change in this basic command value, and the basic command value is corrected. The control valve 11 is driven on overshoot on the basis of this corrected command value.



## LEGAL STATUS

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## CLAIMS

## [Claim(s)]

[Claim 1] The exhaust air reflux control unit of an internal combustion engine characterized by providing the following. The reflux path for making this engine's inhalation-of-air system recycle a part of exhaust gas of an internal combustion engine. The reflux control valve which adjusts the amount of recycle of the aforementioned exhaust gas through this reflux path. A basic instruction value operation means to compute the basic instruction value about the amount of regulation of this reflux control valve based on the load and rotational frequency of an internal combustion engine. An amount operation means of delay compensation to compute the 1st gain for compensating a response time delay after the aforementioned reflux control valve starts operation, until it reaches the target amount of adjustments based on the this basic instruction value change computed, and the 1st time constant, A dead-time operation means to compute a dead time after drive instructions are similarly given to the aforementioned reflux control valve based on a basic instruction value change until this control valve starts operation, An amount operation means of dead-time compensation to compute the 2nd gain for compensating this dead time based on the this dead time computed, and the 2nd time constant, An amount operation means of amendments to compute the amount of amendments about the amount of regulation of the aforementioned reflux control valve based on the basic instruction value these-computed, the 1st and 2nd gain, and the 1st and 2nd time constants, Driving means which drive the aforementioned reflux control valve with the value which amended the aforementioned basic instruction value in this amount of amendments computed.

[Claim 2] It is the exhaust-air reflux control unit of the internal combustion engine according to claim 1 which computes the aforementioned dead time as "0" at the time of un-accelerating [ whose basic instruction value change by which the aforementioned dead-time operation means is said-computed is below a predetermined value ] by the aforementioned amount operation means of delay compensation computing both the 1st gain of the above, and the 1st time constant as "0" at the time of un-accelerating [ whose aforementioned basic instruction value change by which calculation is carried out is below a predetermined value ].

[Claim 3] The aforementioned amount operation means of amendments is operation  $DBEGRF = DEBSE \times (K1 + K2) \times [1 - \exp\{-t / (Tc1 + Tc2)\}]$ , when setting to t the operation period which is applied to Tc1 in K2 and the 1st time constant of the above, and is applied [ value / basic instruction / aforementioned / gain / 1st / DEBSE and / of the above ] to Tc2 and this operation in the 2nd time constant of the the

The exhaust air reflux control unit of the internal combustion engine according to claim 1 or 2 which computes the aforementioned amount DBEGRF of amendments by \*\*\*\*\* (ing).

[Claim 4] The exhaust air reflux control unit of an internal combustion engine characterized by providing the following. The reflux path for making this engine's inhalation-of-air system recycle a part of exhaust gas of an internal combustion engine. The reflux control valve which adjusts the amount of recycle of the aforementioned exhaust gas through this reflux path. A basic instruction value operation means to compute the basic instruction value about the amount of regulation of this reflux control valve


based on the load and rotational frequency of an internal combustion engine. A dead-time operation means to compute a dead time after drive instructions are given to the aforementioned reflux control valve until this control valve starts operation based on the this basic instruction value change computed, An amount operation means of dead-time compensation to compute the gain and the time constant for compensating this dead time based on the this dead time computed, An amount operation means of amendments to compute the amount of amendments about the amount of regulation of the aforementioned reflux control valve based on the basic instruction value these-computed, and gain and a time constant, and driving means which drive the aforementioned reflux control valve with the value which amended the aforementioned basic instruction value in this amount of amendments computed. [Claim 5] The aforementioned dead-time operation means is the exhaust air reflux control unit of the internal combustion engine according to claim 4 which computes the aforementioned dead time as "0" at the time of un-accelerating [ whose aforementioned basic instruction value change by which calculation is carried out is below a predetermined value ].

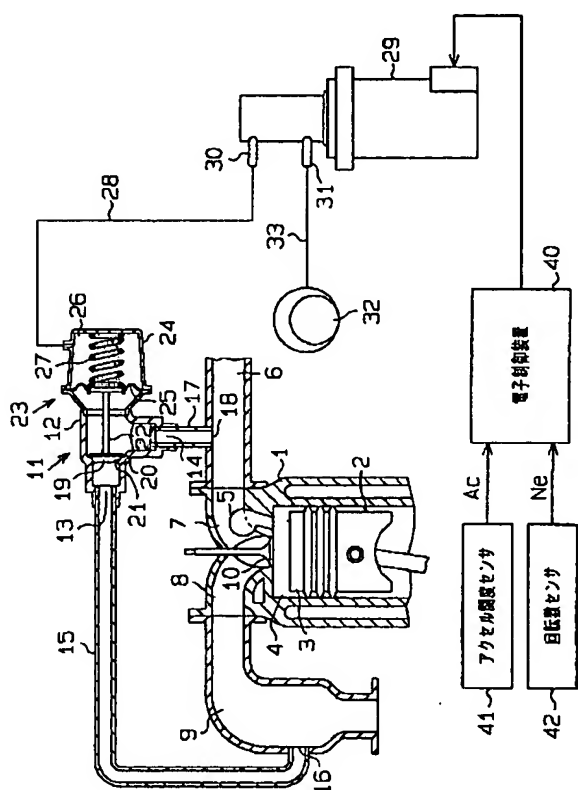
[Claim 6] When setting to  $t$  the operation period which the aforementioned amount operation means of amendments requires for  $K$  in  $DEBSE$  and the aforementioned gain, and requires [ value / basic instruction / aforementioned ] for  $T_c$  and this operation in the aforementioned time constant, it is operation  $DBEGRF = DEBSE \times K \{ 1 - \exp(-t/T_c) \}$ .

The exhaust air reflux control unit of the internal combustion engine according to claim 4 or 5 which computes the aforementioned amount  $DBEGRF$  of amendments by \*\*\*\*\* (ing).

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Drawing selection [Representative drawing] 



[Translation done.]